

THROUGH-HOLE SOLDERING SERVICE LEAD SPLICES	
	<p style="text-align: center;">SERVICE LEAD SPLICES</p> <p>Design applications may require the termination of a discrete leaded component in a non-standard configuration, where the components are not terminated in the manner originally designed for that package type, the component's leads are being used as terminals, and/or where the termination method is not addressed in the NASA standards.</p> <p>These terminations impose stress relief requirements on the solder joint and the component lead seals that must be addressed to ensure reliable operation.</p>

<p style="text-align: center;">PREFERRED END SPLICE</p> <p>The end splice is a version of the lash splice, where the conductor ends are laid side by side, wrapped, soldered, and then insulated with shrink tubing. For inline configurations, the splice section may be bent back against the larger conductor(s) and sleeved for strain-relief.</p>	<p style="text-align: center;">PREFERRED GROUND LEAD / DRAIN WIRE SPLICE</p> <p>The lash splice can be used to attach a ground lead / drain wire to a shielded cable in instances where a solder sleeve is impractical or too bulky. Assembly rating: Easy / Moderate</p>

<p style="text-align: center;">PREFERRED HOOK SPLICE</p> <p>This splice is typically used to terminate discrete, leaded components in "daisy-chain" configurations. The termination has good tensile properties, but is prone to solder joint fatigue if repeatedly flexed. Assembly rating: Easy</p>	<p style="text-align: center;">PREFERRED LAP SPLICE</p> <p>A lap splice is a non-structural splice, where the component lead end and the conductor end are soldered in parallel, overlapping contact to each other. The splice may be simple or complex, and is more compact than a solder sleeve. Assembly rating: Easy</p>

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		<p>Book: 6</p>	<p>Section: 6.16</p>
			<p>Revision Date:</p> <p>Page: 1</p>

THROUGH-HOLE SOLDERING SERVICE LEAD SPLICES (cont.)	
<p style="text-align: center;">ACCEPTABLE COMPONENT LEAD INSULATION</p> <p>The component lead shall be sleeved with tubing, between the lead seal / weld bead to within 2 lead diameters of the solder joint (if applicable). Best Workmanship Practice</p>	<p style="text-align: center;">ACCEPTABLE DAISY-CHAIN</p> <p>The components exhibit acceptable solder terminations and are sleeved to provide strain relief. Best Workmanship Practice</p>

<p style="text-align: center;">ACCEPTABLE CONDUCTOR OVERLAP (LAP / LASH)</p> <p>The conductors in the splice section shall be in parallel, overlapping contact to each other. The soldered section shall be a minimum of 5 – 8 mm (0.2 – 0.3 in.) in length. Best Workmanship Practice</p>	<p style="text-align: center;">UNACCEPTABLE EXCESSIVE OVERLAP</p> <p>The soldered section shall be a minimum of 5 – 8 mm (0.2 – 0.3 in.) in length, but should not contact the insulation jacket(s) or the lead seal / weld bead. Excessive overlap increases stress on the component lead and body seal / weld bead. Best Workmanship Practice</p>

<p style="text-align: center;">ACCEPTABLE HOOK SPLICE ORIENTATION</p> <p>The conductor and the component lead shall be aligned approximately 90° to, and in contact with, each other. In multiple conductor configurations, the direction of each additional conductor wrap shall be alternated, and shall not overlap. Best Workmanship Practice</p>	<p style="text-align: center;">ACCEPTABLE INSULATION GAP</p> <p>The conductor(s) shall exhibit proper insulation spacing. In multiple conductor configurations, the conductor insulation gaps shall be approximately equal. NASA-STD-8739.3 [9.1.1], [9.1.2] NASA-STD-8739.4 [10.1.7.a]</p>

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**THROUGH-HOLE SOLDERING
SERVICE LEAD SPLICES (cont.)**



**ACCEPTABLE
INSULATION SLEEVING APPLICATION**

The completed solder joint shall be over-sleeved with transparent / translucent heat shrink tubing of sufficient length to cover the solder joint and extend over the insulation of each conductor a minimum of 5 mm (0.20 in.).

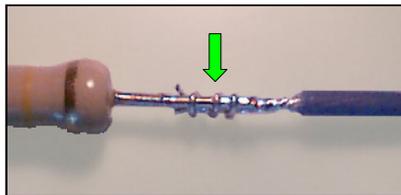
[Best Workmanship Practice](#)



**UNACCEPTABLE
EXPOSED TERMINATION**

The shrink tubing has been improperly installed, resulting in exposure of the conductive surface. The tubing should be of sufficient length to cover the solder joint and extend over the insulation of each conductor a minimum of 5 mm (0.20 in.).

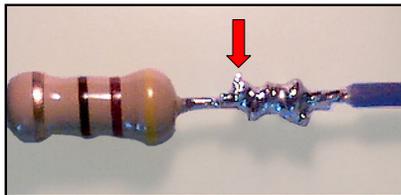
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**ACCEPTABLE
LASH WINDING**

The lash shall consist of a tinned, solid 34 AWG (or smaller) conductor, tightly wrapped in an open spiral of approximately 4-6 complete, non-overlapping turns, approximately centered over the splice. Lash ends shall be trimmed flush.

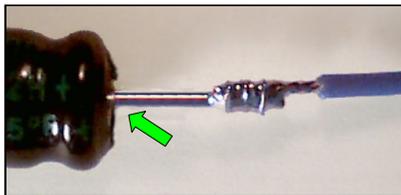
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**UNACCEPTABLE
IMPROPER LASH / WRAP**

The lash has been completed with a conductor the same gage as the mated conductors, resulting in an insufficient number of wraps to achieve a secure mechanical termination.

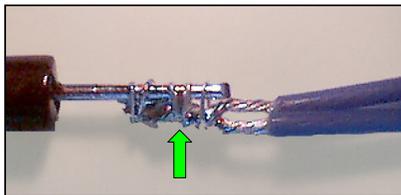
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**ACCEPTABLE
LEAD SEAL / WELD BEAD SPACING**

The component end of the solder joint shall not be closer than 2 lead diameters or 0.50 mm (0.020 in.), whichever is larger, from the lead seal / weld bead.

[Best Workmanship Practice](#)



**ACCEPTABLE
MULTIPLE / COMPLEX CONFIGURATIONS**

In multiple conductor configurations, the conductor ends may be twisted together, with the twisted section parallel to, and in contact with, the component lead.

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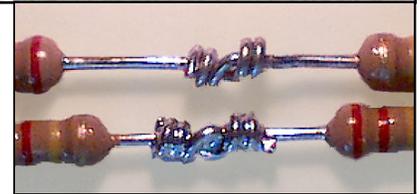
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SERVICE LEAD SPLICES (cont.)**



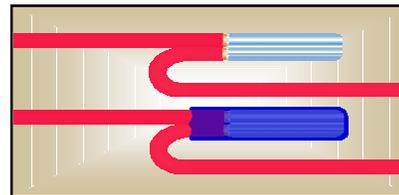
**PREFERRED
LASH SPLICE**

A lash splice is a structural splice, consisting of a lap splice with a single strand overlap winding mechanically binding the lead and conductor together. The splice may be simple or complex, and is more compact than a solder sleeve. Assembly rating: Easy / Moderate



**PREFERRED
LINEMAN / WESTERN UNION SPLICE**

This splice is best suited for the termination of wire and cable, but can be used for the termination of discrete component leads. The splice is suitable for situations where the termination may be subjected to tensile loading. Assembly rating: Difficult



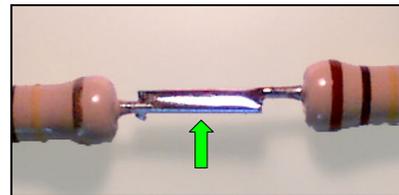
**PREFERRED
MAGNET WIRE SPLICE**

After stripping and preparing for soldering, the ends of the wires shall be twisted together a minimum of three turns in an end slice configuration, soldered, and insulated. The splice section shall be bent back against the larger conductor and strain-relieved.



**PREFERRED
SOLDER SLEEVES**

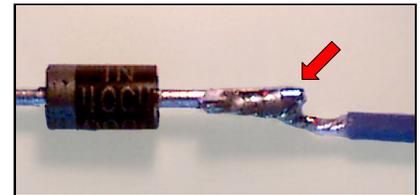
Originally developed for the termination of cable shield drain wires, solder sleeves produce a one-step, insulated, and sealed splice. Solder sleeves are typically larger than that achievable with a lap or lash splice.



**ACCEPTABLE
ANGULAR ALIGNMENT (LAP / LASH)**

Angular misalignment of less than 2 lead diameters (measured at the conductor ends of the splice section) is allowable, provided there are no protruding or sharp edges.

[Best Workmanship Practice](#)



**UNACCEPTABLE
LEAD / CONDUCTOR MISALIGNMENT**

Angular misalignment in excess of 2 lead diameters (measured at the conductor ends of the splice section) produces a mechanically weak solder joint, with protruding ends or sharp edges.

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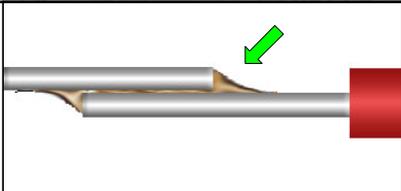
**THROUGH-HOLE SOLDERING
SERVICE LEAD SPLICES (cont.)**



**ACCEPTABLE
SERVICE LEAD**

The service lead conductor(s) shall be insulated stranded wire, unless otherwise specified in the engineering documentation.

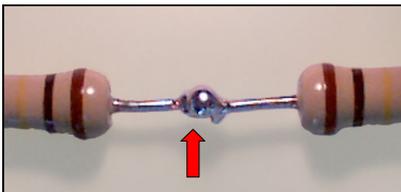
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**ACCEPTABLE
SOLDER FILLET**

The solder joint shall comply with all the basic requirements of NASA-STD-8739.3 for a solder termination. The termination shall be fully wetted, with a smooth, shiny, concave fillet. The contour of the lead and conductor shall be discernable.

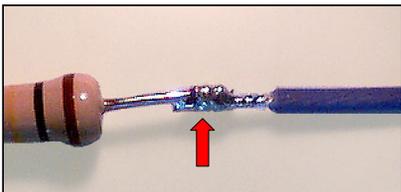
[NASA-STD-8739.3 \[13.6 \]](#)



**UNACCEPTABLE
BUTT SOLDER JOINT**

Butt solder terminations shall not be used.

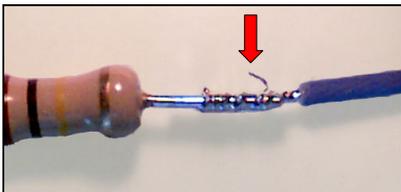
[Best Workmanship Practice](#)



**UNACCEPTABLE
INSUFFICIENT OVERLAP**

The soldered section shall be a minimum of 5 – 8 mm (0.2 – 0.3 in.) in length to ensure the formation of a proper solder fillet, especially if a lap termination is used.

[Best Workmanship Practice](#)



**UNACCEPTABLE
PROTRUDING LASH END**

The end of the lash winding has not been properly trimmed, creating a potential short circuit problem.

[Best Workmanship Practice](#)



**UNACCEPTABLE
SPLICE LOCATED IN FLEXURE ZONE**

The termination shall not be located in a flexure zone.

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